

The Society has shown itself remarkably liberal in the distribution of its medals; out of the 109 which have been awarded since its foundation, 37 have been given to foreign explorers and geographers. Mr. Markham gives a brief and interesting sketch of the great advances in geographical knowledge which have been made since the Society was founded, but shows at the same time how much remains to be done, even when we have obtained a rough knowledge of the whole of the earth's surface, while deep-sea research is yet only in its infancy. The little volume also contains an admirably-arranged list of papers in the *Journals* and *Proceedings* of the Society, covering nearly fifty pages; this, we believe, is the work of the librarian, Mr. Rye, and will be of the greatest value for reference.

Altogether it is evident that in recent years geography not only has made immense advances in the knowledge it has acquired of the "world and they that dwell therein," but has acquired a character which entitles it distinctly to be regarded as a department of science.

THE LATE A. H. GARROD'S SCIENTIFIC PAPERS

In Memoriam. The Collected Scientific Papers of the late Alfred Henry Garrod, M.A., F.R.S. (London: R. H. Porter, 1881.)

FEW customs are gaining greater ground at the present day than that of making the death of any man who, by his energy or talents, has raised his name a little above that of the unknown crowd, a reason for opening a subscription and calling upon all his friends and admirers to tax themselves to found a memorial commemorative of his career. It is first decided that there shall be a memorial, and then the question usually arises as to the form that it shall take. It very often happens that some person or some institution has a need at hand. The prosperity of a school, and indirectly of all connected with it, will be promoted if it has scholarships attached to it which will attract needy students. A window is wanted to complete the ornamentation of a church. Those interested in the church or school eagerly seize upon the opportunity which the hand of death has afforded, and suggest a fitting method of bearing testimony to the memory of the departed. Such memorials generally, after a few years, retain wonderfully little personal connection with him they are supposed originally to honour. The name remains, but the person is forgotten, unless preserved in remembrance for other and more cogent reasons.

Personal memorials of really eminent men, of those who have done good service to mankind, are of inestimable value. True records of their lives, their character, their works, their words, even of their features, afford encouragement and example to all who come after. By such memorials the whole world is enriched and its progress ensured. Among such we scarcely know of any more appropriate to its subject than that which has just been carried out by the Garrod Memorial Committee. It is a handsomely printed large octavo volume of 527 pages, containing an excellent portrait, a memoir, and a reproduction of all the important contributions to science made during the short but fruitful career of the extremely talented biolo-

gist whose loss we deplored almost exactly two years ago. The work contains, in a most convenient form for reference, a vast number of facts relating chiefly to the anatomy of birds and mammals, together with all the figures with which the several memoirs were originally illustrated, and a copious index. It has been ably edited, evidently as a labour of love, by Prof. Garrod's successor in the post of prosector to the Zoological Society, Mr. W. A. Forbes, with the assistance for the physiological portion of Prof. E. A. Schäfer. Mr. Garrod was all his life favourably circumstanced to a remarkable degree for pursuing biological research. He had from his earliest age the advantage of scientific associations and the best of educations, and was soon placed in an independent position, which enabled him to make the occupation of his life that which almost all others, even those holding most of the existing scientific appointments, can only do in snatches of time saved from the educational or administrative duties connected with their offices. Of all these advantages he fully availed himself; but considering he was only thirty-three years old at the time of his death, the amount of his already-published work when collected together is surprising, and causes the greater regret that he was not spared to continue what he had so well begun, especially as his editor tells us of the immense amount of material in notes and drawings which he had accumulated, besides that which was in a sufficiently finished state to see the light.

In these days, when so much is being said about the encouragement of scientific research, and so many experiments are being tried, both with public and private money, as to the best means of promoting this end, we cannot help making the reflection, before concluding our notice of this volume, on the great results that may follow a small expenditure judiciously and steadily devoted for a series of years to one object. If the Zoological Society had not in 1865 established its prosectorship, we should have seen little of the really solid advances in our knowledge of the anatomy of the two higher classes of vertebrated animals contained in the valuable memoirs of Dr. Murie, those collected in the present volume, and those now in the course of publication by Mr. Garrod's successor in the office.

THE DIAMONDS, COAL, AND GOLD OF INDIA

The Diamonds, Coal, and Gold of India. By V. Ball, F.G.S. 12mo. (London: Trübner, 1881.)

IN this handy little volume the author presents us with a compendium of the facts known concerning the occurrence and distribution of the three principal mineral products of India. The work being so designed that it may be used as a handbook to the detailed accounts published by the Geological Survey of India and by other authorities in numerous scattered publications to which full references are given. In the first chapter the different localities producing diamonds, including both active and abandoned mines, are noticed in some detail. These are grouped into three areas, the most southerly being that to which the name of Golconda is usually applied, although, as the author points out, that town is not actually in a diamond producing district, but was the staple place where the product of the district was bought and sold.

The actual mines are in the southern part of the Madras presidency, in the districts of Kadapah, Karnul, Kistna, and Godaveri. The second great tract, further to the north, lies between the Mahanadi and Godaveri rivers, the chief localities being at Sambalpur and Weiragud, eighty miles south-east from Nagpore, and at a few places in Chota Nagpore. The third great tract is in the vicinity of Panna in Bandelkhand. In addition to these a few small diamonds are reported to have been found near Simla. In all cases the diamonds appear to have been found in sandstones or conglomerates, or in the gravels derived from their alteration. These sandstones are referred in the southern localities to the lowest member of the Karnul formation, which as a whole is considered to be the equivalent of the lower part of the so-called Vindhyan formation of Northern India. An upper group of the latter, the Rewah conglomerate, being the diamond-bearing bed in Bandelkhand. There does not appear to be any authenticated instance of a diamond being found in India in other than sedimentary rocks. One case, however, at p. 49, where the matrix is said to be "a network of strings of calc spar inclosing laminæ and small lumps of green clay," suggests the possibility of the material in question being a decomposed basalt or basaltic tuff, and as such comparable with the South African occurrences. What the present total production of the mines may be we are left to guess; as far as can be gathered from the scattered notices collected by the author, the larger number of the mines are of historical interest only.

The second chapter, that on Coal, is mainly an abstract of the communications on this subject made to the Records of the Geological Survey of India by Mr. Theodore Hughes, and is rather behindhand in point of time. The latest information appears to refer to the year 1878-79. The arguments for and against the supposed Mesozoic age of the Indian coal-bearing rocks are given in abstract with great fairness, and the author's conclusion that "floras alone form an unsafe guide to the correlation" of the ages of rocks in different countries is probably the only safe one that can be drawn from the available evidence. As a mere question of stratigraphical position it is probable that these rocks represent the uppermost coal-measures (Permo-Carboniferous) of Europe. Any one acquainted with the smaller coal-basins in the south of Europe cannot but be struck with the numerous analogies between them and the Indian coal-fields, more particularly in the thickness and irregularity of the seams. The author's statement that the Ramgunj coal "may be described as a non-caking bituminous coal," is rather too general. It is true for the larger seams, but besides these are to be found others in which the caking property is as well developed as in any caking coal in the world. The coke produced is not of particularly good quality, which is however due to the large quantity of ash in the coals, but as to their caking capacity, there can be no doubt whatever. The estimation as to the quantity of coal available seems to be rather wild guesses in some cases, and one of these, for which the data are professedly given, is a good specimen of an arithmetical puzzle. They are as follows (p. 69):—

"The coal occurs in three principal seams . . . average total thickness of 16 feet . . . over an area of $8\frac{1}{2}$ square

miles. The amount of coal may therefore be estimated at 1,360,000,000 tons, and the available portion of this at 80,000,000."

How the largest of the above figures is obtained, and what its relation to the smaller quantity may be, is certainly not apparent from the author's statement. An allowance of 94 per cent. for faults, waste, and unworkable coal, which the above figures lead to, seems rather large.

The chapter on Gold contains extracts from most of the published details on the occurrence of precious metals in India down to the Reports of Mr. Brough Smyth, and the latest remarks of Indian newspapers, which latter however are dated as far back as May, 1880. An original investigation of the author's as to the distribution of auriferous detritus in areas occupied by rocks of different characters is of interest. He found that the proportion of gold obtained was larger upon crystalline schists than upon gneiss and granite, a result which agrees with that generally obtained in other parts of the world. As this was predicted to him by his native workmen, it is difficult to see how the author arrives at his belief that gold washing in India affords an example of human degradation.

His evidence seems rather to show that the gold washers have a highly skilled and minute knowledge of the distribution of gold-bearing alluvia, but the value of such knowledge is diminished by the circumstance that the amount of such material available has been practically exhausted by the labours of many generations of workers through a period of 2000-3000 years. The great extent of old workings discovered in some of the Wynaad mines also shows that the "old men" were no contemptible workers as vein miners.

In the earlier part of the volume the work done by "amateurs" in Indian geology is somewhat pointedly contrasted with that of the "professionals," whose whole time is devoted to the subject. This is to be regretted, as is also the assumption of an air of finality for the work of the Indian Survey, which the nature of the work certainly does not allow. For instance, we are told in the same paragraph that the rocks of the Vindhyan formation are absolutely azoic, and that they may be of any age, from Lower Silurian to Carboniferous; the real meaning of this expression being that no fossils have as yet been found in them. In this sense the New Red Sandstone might be said to be azoic over a great part of the central plain of England. The results of the Indian Survey are of great value as furnishing a broad outline of the stratigraphical features of the peninsula, but there will be work enough and to spare for both amateur and professional for many years to come before that outline is moderately filled in detail.

H. B.

OUR BOOK SHELF

The Student's Handbook of Acoustics. By John Broadhouse. (London: William Reeves, 1881.)

WE are not quite sure what the title of this work is. The title just given is from the lettering on the back. Within the covers appears a second title, "Musical Acoustics," and on the actual title-page appears the triple announcement, "The Student's Helmholtz," "Musical Acoustics," and "The Phenomena of Sound as connected with